

Verified by the Canadian ETV Program



TYMCO Model DST-4 Regenerative-Air Sweeper *Technology Fact Sheet for TYMCO, Inc.*

Performance Claim

The TYMCO Model DST-4 Regenerative-Air Street Sweeper was operated according to the vendor's specifications at an average speed of 4.1 km/h in a controlled space where no water or any other liquids were permitted. No water sprays or gutter broom shrouds were used in the testing.

The sweeper was delivered in its optimum balance of dry-dustless operational mode while also maximizing the pick-up and removal of test material (mean size of test material is three microns).

The final average performance indicators – at the 95% confidence interval – of the TYMCO Model DST-4 Regenerative-Air Street Sweeper are as follows:

1. A removal efficiency of test material from surface of 89% ($\pm 2.1\%$);
2. Deposit of test material on sidewalk of 0.06% ($\pm 0.04\%$);
3. Maximum concentration of PM₁₀ air contamination of 0.015 (± 0.005) mg•m⁻³•kg⁻¹;
4. Total concentration of PM₁₀ air contamination of 11.0 (± 2.3) mg•m⁻³•kg⁻¹;
5. Maximum concentration of PM_{2.5} air contamination of 0.011 (± 0.003) mg•m⁻³•kg⁻¹; and
6. Total concentration of PM_{2.5} air contamination of 7.5 (± 2.2) mg•m⁻³•kg⁻¹.

Technology Application

TYMCO Regenerative Air Sweeper Technology is designed to thoroughly clean roads and streets while minimizing the release of dust into the air. The street sweeper can have a positive environmental effect by reducing the amount of materials entering the storm sewers which may otherwise end up contaminating surface waters. Additionally, removal of particulate from streets may help reduce airborne contamination by such particulate matter, particularly on windy days.

Performance Conditions

The TYMCO Model DST-4 was tested at the Prairie Agricultural Machinery Institute (PAMI) facility (Test Agent, TA) in Humboldt, Saskatchewan over three test days in June of 2008. The test facility was an enclosed tent about 80m x 11m. The test material was Camel-Wite®, manufactured by Debro Chemicals and Pharmaceuticals, a calcium carbonate-based powder with a mean diameter of about three microns. Approximately 274 kg were applied to the test track, which consisted of two strips, 2.75 m x 30 m each. The test agent conducted the testing and measurement according to the "PM₁₀ and PM_{2.5} Street Sweeper Efficiency Test Protocol" (City of Toronto, April 2008).

Environmental Technology Verification

Technology Description

The TYMCO Model DST-4 is a mid-sized dustless sweeper. The main components are: a blower; a pick-up head; a large hopper; a cyclone; and air filters. The closed loop Regenerative-Air system uses a large blower to develop airflow. The air enters a distribution manifold that runs across the pick-up head, which has a discharge opening that directs a high velocity blast of air down and onto the pavement and into the cracks to release dirt. The air and all captured dirt and debris are then drawn out of the pick-up head through a hose and directed into the hopper.

After the debris-laden air stream is drawn into the hopper, the air loses velocity, allowing the larger debris to fall to the bottom of the hopper. A screen at the top of the hopper prevents items such as leaves, paper, cans, and rocks from leaving the hopper. The air then enters the cyclone (the centrifugal dust separator). The cyclone further cleans the air as it spins on the curved wall of the chamber, skimming off dust particles and returning them into the hopper. The cleaned air is returned through the blower to the pick-up head to start the regenerative air cycle again.

A small portion of the air leaving the blower is exhausted to the atmosphere so that less air enters the pick-up head than is being drawn off, thus maintaining the necessary vacuum in the pick-up head. Prior to being exhausted, this small portion of air is further cleaned by being first run through a bank of small cyclone pre-cleaners and then through membrane filters that clean the exhausted air of 0.5 micron size particulates.

TYMCO Model DST-4 technology is engineered to allow the sweeper to perform in all types of weather conditions with no operator adjustments required.

Verification

The verification was conducted by ORTECH Environmental of Mississauga, Ontario as the Verification Entity using ETV Canada's General Verification Protocol (February, 2007). The verification was based on information supplied by TYMCO, Inc., and the performance tests conducted by the TA on the TYMCO Model DST-4 Regenerative-Air Street Sweeper in June of 2008 according to the "PM₁₀ and PM_{2.5} Street Sweeper Efficiency Test Protocol" (City of Toronto, April 2008).

What is the ETV Program?

The Canadian Environmental Technology Verification (ETV) Program is delivered by The Bloom Centre for Sustainability (BLOOM) under a license agreement from Environment Canada. The Canadian ETV Program is designed to support Canada's environment industry by providing credible and independent verification of technology performance claims.

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